

A REVIEW OF THE ANTS OF THE GENUS *LASIUS* FABRICIUS, 1804, SUBGENUS *DENDROLASIUS* RUZSKY, 1912 (HYMENOPTERA: FORMICIDAE) FROM EAST PALAEARCTIC

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Abstract.— The taxonomy of the ant subgenus *Dendrolasius* Ruzsky, 1912 is reviewed on the base of the investigation of types and of non-type material of several species. *L. fuji* is described as a new species, which includes former *L. fuliginosus* (Latreille, 1798) from the East Palaearctic. *L. nipponensis* Forel, 1912, proposed by Espadaler et al. 2001 as the replacement name for "oriental *fuliginosus*", actually is a good species and the senior synonym of *L. crispus* Wilson, 1955; *L. orientalis* Karawajew, 1912 is revived from synonymy and is considered as the senior synonym of *L. teranishii* Wheeler, 1928; *L. capitatus* Kusnetzov-Ugamsky, 1928 is considered as a good species, different from *L. crispus*. A key to *Dendrolasius* workers and queens from the Eastern Palaearctic is also given.



Key words.— Ants, taxonomy, *Lasius*, *Dendrolasius*, new species, new synonyms, East Palaearctic.

INTRODUCTION

The ants of the subgenus *Dendrolasius* Ruzsky, 1912 are the most peculiar both morphologically and biologically among all *Lasius* Fabricius, 1804 species. These so-called jet black ants have a quite high level of social organisation, form large colonies, usually build big carton nests in living trees, and are characterised by their specific, strong smell. All of them are distinctly bigger than other *Lasius* species (workers' body size up to 4.5 – 5.5 mm), have shiny black or dark brownish-black body, and a distinctly emarginate occipital margin of the head in most species.

This subgenus includes eight species only (taking into account the present revision), two of which distributed in the Western Palaearctic (as far east as the Altai Mts.), and six others found in the eastern part of the Region, e. g. in the southern part of Russian Far East (as far west as the Amursky Region), north-eastern China, Korean Peninsula, and Japan; one species was also found in Taiwan.

Ruzsky (1912) described the subgenus *Dendrolasius* including one species – *L. fuliginosus* (Latreille, 1798). In the same year, two new forms belonging to this subgenus were described: *L. fuliginosus* var. *nipponensis*

Forel, 1912 from Japan, and *L. fuliginosus* var. *orientalis* Karawajew, 1912 from Korea. A little earlier Wheeler (1910), based on the single very peculiar queen found in Japan, described *L. spathepus*, which also belongs to the subgenus *Dendrolasius*.

Later on, several *Dendrolasius* species and infra-specific forms were described: *Acanthomyops fuliginosus* var. *capitatus* Kusnetzov-Ugamsky, 1928 from Russian Far East; *L. teranishii* Wheeler, 1928 from Japan; *L. ouchii* Teranishi, 1940 from Japan; *L. buccatus* Stårcke, 1942 from Bosnia; *L. crispus* Wilson, 1955 from Japan and Korea; *L. morisitai* Yamauchi, 1978 from Japan.

After complete or local revisions and reviews of the genus *Lasius* or its subgenus *Dendrolasius* (Wilson 1955; Yamauchi and Hayashida 1968; Yamauchi 1978; Kupyanskaya 1989, 1990; Espadaler et al. 2001; see also Bolton 1995) the number of the valid *Dendrolasius* species was reduced to seven.

Despite the presence of many publications dealing with the subgenus *Dendrolasius*, there were still quite a lot of unresolved taxonomic questions. I had the opportunity to investigate the types of several species and infraspecific forms, what allowed to me to solve some problems and clarify the taxonomic situation of this Palaearctic subgenus.

MATERIAL AND METHODS

This work is based on the investigation of some collected personally material and of type and non-type specimens, preserved in different museums and institutions: Museum of the Comparative Zoology of Harvard University, Cambridge, Massachusetts, USA (MCZ); Muséum d'Histoire naturelle, Geneva, Switzerland (MHNG); Institute of Zoology of the Ukrainian National Academy of Sciences, Kiev, Ukraine (IZK); Museum and Institute of Zoology of the Polish Academy of Sciences, Warsaw, Poland (MIZ); Jagiellonian University, Cracow, Poland (JUK); Zoological Museum of the Moscow State University, Russia (ZMMU); Zoological Institute of the Russian Academy of Sciences, St.-Petersburg, Russia (ZIN); Biological and Soil Institute of the Russian Academy of Sciences, Vladivostok, Russia (BPI).

The following measurements (in mm) and indices are used:

HL₁ – head length in full-face view, measured from the mid-point of the occipital margin to the mid-point of the anterior clypeal margin; HL₂ – head length in full-face view, measured as a diagonal line from the uppermost point of an occipital corner to the mid-point of the anterior clypeal margin; HW₁ – maximum head width in full-face view, excluding eyes; HW₂ – minimum head width near the level of the mandibular insertion; SL – maximum straight-line length of the antennal scape in profile; OL – maximum diameter of the eye; AL – diagonal length of the alitrunk seen in profile, from the neck shield to the posterior margin of propodeal lobes (workers), or from the anterio-dorsal point of alitrunk to posterior margin of propodeal lobes (queens).

Indices:

CI = HW₁ / HL₁; CLI = HL₂ / HL₁; CWI = HW₁ / HW₂; SI₁ = SL/HL₁; SI₂ = SL/HW₁; OI = OL / HW₁.

TAXONOMY

Lasius (Dendrolasius) nipponensis Forel, 1912, stat. rev. (Figs 1–7, 15–21)

Lasius fuliginosus var. *nipponensis* Forel 1912: 339, w, nec q, Japan.

Lasius nipponensis: Santschi 1941: 278 (raised to species).

L. fuliginosus var. *nipponensis*: as junior synonym of *L. fuliginosus* (Latreille): Wilson 1955: 138; Yamauchi 1978: 171; Bolton 1995: 224; revived from synonymy and raised to species as the first available replacement name for "oriental *fuliginosus*": Espadaler et al. 2001: 340; Imai et al. 2003: 60.

Lasius crispus Wilson, 1955: 144, w, q, m, Japan (unresolved primary homonym of *Lasius crispus* Théobald, 1935: 68, France, Miocene); Yamauchi and Hayashida 1968: 401, 402; Yamauchi 1978: 174, syn. nov.

Material examined. Paralectotypes, 3 workers on the same pin, "*L. fuliginosus* Latr., worker, Tokyo (Yano)",

"*v. nipponensis* Forel, worker, Type, Tokyo" (both hand written by Forel), "Coll. Forel", "Typus" (red printed label) (MHNG); "paralectotype" queen, "*L. fuliginosus* Latreille, ♀, Japan (Yano)", "*v. nipponensis* Forel, ♀, Type, Tokyo" (both hand written by Forel), "Coll. Forel", "Typus" (red printed label) (MHNG) (really this queen is *L. fuji*, see below). Non-type material: more than 20 workers, 2 queens from the Russian Far East, North Korea and Japan (IZK, MIZ, ZMMU, BPI, JUK).

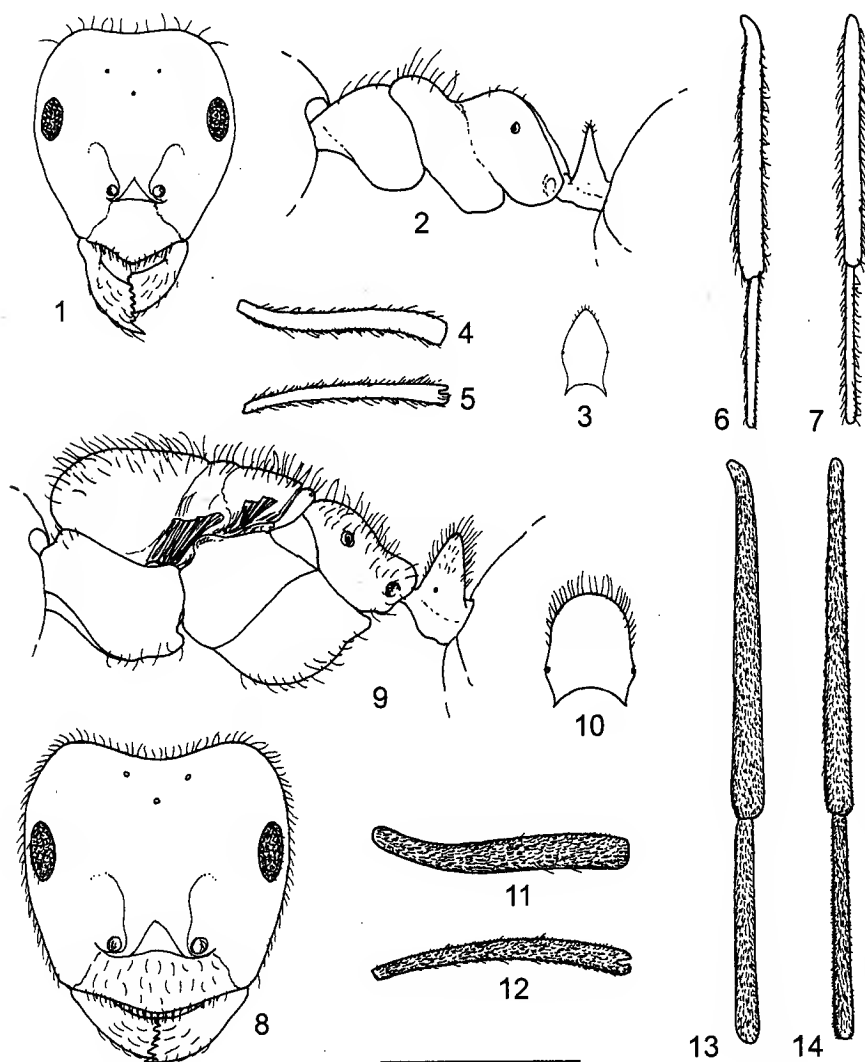
Measurements and indices of the paralectotype workers: HL₁ = 1.09–1.25, HL₂ = 1.15–1.30, HW₁ = 1.09–1.26, HW₂ = 0.67–0.76, SL = 1.01–1.18, OL = 0.23–0.25, AL = 1.26–1.51; CI = 1.00–1.01, CLI = 1.04–1.05, CWI = 1.63–1.67, SI₁ = 0.92–0.94, SI₂ = 0.92–0.94, OI = 0.20–0.21.

Diagnosis of workers and queens. Workers: petiolar scale (seen in profile) thin, distinctly narrowing to the top and with flattened dorsal crest, symmetrical; seen in front or from behind, it is the widest at the level of the spiracles, clearly tapering to the top, its dorsal crest narrowly rounded, without notch; head in full face view distinctly narrowing anteriorly and with shallowly emarginate occipital margin; scape, mid and hind tibiae not flattened, elliptical in cross-section; ratio of min/max diameters of the scape > 0.7; scape and legs with numerous subdecumbent hairs; promesonotal dorsum and occipital margin with rather long standing hairs; body with sparse, short decumbent pubescence.

Queens: petiolar scale (seen in profile) thin, narrowing to the top; head in full face view distinctly narrowing anteriorly, with almost straight lateral margins in front of the eyes, and with hardly emarginate occipital margin; scape, mid and hind tibiae not flattened, elliptical in cross-section; ratio of min/max diameters of the scape > 0.7; legs and scape with dense decumbent pubescence and numerous subdecumbent hairs; head, alitrunk and gaster with very abundant, long, often curved standing hairs.

Notes. Forel (1912) described *L. fuliginosus* var. *nipponensis* from workers and queen from Japan (vicinity of Tokyo). The most important features, separating the workers of this form from those of *L. fuliginosus*, have been emphasised in the original description: "... l'écaille de l'ouvrière est assez tranchante et non obtuse, la tête est plus rétrécie devant..." [e.g.: ... the petiolar scale of the worker is rather sharp (thin) and not blunt, the head is narrower anteriorly...] (loc. cit., p. 339). These features fully correspond to those of the type specimens (see above).

The taxonomic position of *L. nipponensis* is somewhat confused because the queen, described by Forel (1912), indeed belongs to the "*oriental fuliginosus*". It has a thick, slightly narrowing to the top petiolar scale (seen in profile); mid and hind tibiae and tarsi with dense decumbent pubescence only, without subdecumbent hairs; the head in full face view only slightly narrowing anteriorly, with distinctly emarginate occipital margin, and with abundant, though relatively short,



Figures 1–14. 1–7. *Lasius nipponensis* Forel, 1912 (worker, paralectotype) and 8–14 *L. fuji* sp. nov. ("paralectotype" queen of *L. nipponensis*); (1, 8) head, frontal view; (2, 9) alitrunk and petiole, in profile; (3, 10) petiolar scale, frontal view; (4, 11) scape, dorsal view; (5, 12) same, lateral view; (6, 13) hind tibia and first tarsal joint, lateral view; (7, 14) same, dorsal view. Scale bar = 1 mm.

standing hairs projecting from its outline (see Figs 8–14). All these features correspond with the current treatment of the queens of the "oriental *fuliginosus*" (see also Yamauchi and Hayashida 1968; Yamauchi 1978; Kupyanskaya 1989, 1990, and Figs 59–65).

Wilson (1955) synonymised this name with *L. fuliginosus*, and wrote such comments about the lectotype specimen of var. *nipponensis*, designated by him: "... a worker in the Forel collection. Head and thorax partly crushed and not measurable. Pilosity of petiolar dorsal margin long, characteristic of the Japanese population already described..." (loc. cit., p. 143). Most of subsequent authors (Yamauchi and Hayashida 1968; Yamauchi 1978; Kupyanskaya 1989, 1990; Bolton 1995) repeated this synonymy without any further explanations. However, Espadaler et al. (2001) provided both morphological

and molecular evidence that ants from the eastern Palaearctic, previously determined as *L. fuliginosus*, are not conspecific with the "typical" *L. fuliginosus* (Latreille), distributed in the western Palaearctic (e.g. as far east as the Altai Mts.), and proposed for this species the name *L. nipponensis* Forel (as the oldest name attributed to "oriental *fuliginosus*"). Yet, they did not examine the types of var. *nipponensis*. Actually, *L. nipponensis* is not conspecific with "oriental *fuliginosus*", whose workers have a much thicker, not narrowing at the top petiolar scale (seen in profile), a less anteriorly narrowing head with distinctly emarginate occipital margin, etc. (compare Figs 1–7 and 52–58). Furthermore, queens of these species differ even more than their workers (see above).

Wilson (1955) described *L. crispus* from workers, queens and males from Japan and Korea. The most important diagnostic features of the workers were: "... femora with numerous outstanding decumbent to suberect hairs. Cephalic and gastric pilosity denser than in *fuliginosus*. Petiolar crest viewed from the side thinner and sharper than in *L. fuliginosus*, the anterior and posterior faces less convex..." (loc. cit., p. 144). According to this and the detailed treatment of *L. crispus* given by Yamauchi (1978) and Kupyanskaya (1989, 1990, as junior synonym of *L. capitatus*), it is obvious that *L. crispus* has the same diagnostic features of *L. nipponensis*.

First of all, the thin petiolar scale, the distinctly anteriorly narrowing head, the hairy legs and scape, etc., combined with the not flattened scape; all these led me to formally synonymise *L. crispus* with *L. nipponensis*.

Distribution. Southern part of Russian Far East (Primorsky Region), Korean Peninsula, Japan (Hokkaido, Honshu, Shikoku), Taiwan.

Lasius capitatus (Kusnetzov-Ugamsky, 1928) (Figs 22–28)

Acanthomyops fuliginosus subsp. *capitatus* Kusnetzov-Ugamsky 1928: 18, w, Russian Far East (Kusnetzov-Ugamsky 1927: 187, *nomen nudum*); transferred to *Lasius* as the junior synonym of *L. fuliginosus* (Latreille):

Wilson 1955: 138; revived from synonymy and raised to species as the senior synonym of *L. crispus* Wilson: Kupyanskaya 1989: 785, w, q, m; Kupyanskaya 1990: 229; Bolton 1995: 222 ("Turkestan" is erroneously given as the type locality); Imai et al. 2003: 60.

Material examined. Lectotype worker, "Okeanskaya nr. Vladivostok, Siberia, VIII-1926, N. Kusnetsov" (probably hand written by Wilson); "*Lasius fuliginosus capitatus* Kusnetsov LECTOTYPE" (hand written by Wilson); "M.C.Z. Type 30143" (MCZ, designated by Wilson, 1955); paralectotype worker, "Okeanskaya nr. Vladivostok, Siberia, VIII-1926, N. Kusnetsov" (hand written by Wilson); "Turkestan N. Kusnetsov" (Sic!) (printed original label from Kusnetsov's collection); "Lectotype nest series" (hand written by Wilson); "Cotype" (red printed label); "*Lasius fuliginosus capitatus* Kuzn.-Ugams. det. E. O. Wilson" (hand written by Wilson); "M.C.Z. Type 30143"; paralectotype worker, "*Acanthomyops fuliginosus orientalis* (= *capitatus* m.) Far East Station Okeanskaya near Vladivostok" (probably hand written by Kusnetsov); "Turkestan N. Kusnetsov" (Sic!) (original printed label from Kusnetsov's collection); "Lectotype nest series" (hand written by Wilson); "Cotype" (red printed label); "M.C.Z. Type 30143" (MCZ). Non-type material: 5 workers from the Russian Far East (IZK, BPI).

Labels of paralectotype specimens are misleading for the presence of the labels "Turkestan N. Kusnetsov" together with the locality "Far East Station Okeanskaya near Vladivostok". Probably it is simply a labelling error in Kusnetsov's collection.

Measurements and indices of the type specimens (data of the lectotype are in brackets): $HL_1 = 1.25-1.29$ (1.29), $HL_2 = 1.32-1.36$ (1.36), $HW_1 = 1.22-1.27$ (1.27), $HW_2 = 0.78-0.85$ (0.85), $SL = 1.11-1.12$ (1.12), $OL = 0.24-0.27$ (0.27), $AL = 1.34-1.44$ (1.44); $CI = 0.97-1.00$ (0.99), $CLI = 1.05-1.07$ (1.05), $CWI = 1.49-1.59$ (1.49), $SI_1 = 0.87-0.89$ (0.87), $SI_2 = 0.89-0.92$ (0.88), $OI = 0.19-0.21$ (0.21).

Queens and males are unknown.

Diagnosis. Workers: petiolar scale (seen in profile) relatively thin, though not flattened at the top, approximately inversely V-shaped; when seen in front or from behind, it is slightly narrowing, not tapering to the dorsal crest; head with convex sides, gradually and slightly narrowing anteriorly, with rather shallowly emarginate occipital margin; scape, mid and hind tibiae not flattened, elliptical in cross-section; ratio of min/max diameters of the scape > 0.7 ; scape and legs with decumbent pilosity only; promesonotal dorsum and occipital margin with short and sparse standing hairs; third joint of maxillary palps is the longest, each following joint is somewhat longer than the next one; The combination of these features distinctly separates this species both from *L. nipponensis* (see above and Figs 1-7) and from *L. fuji* (see below and Figs 52-58).

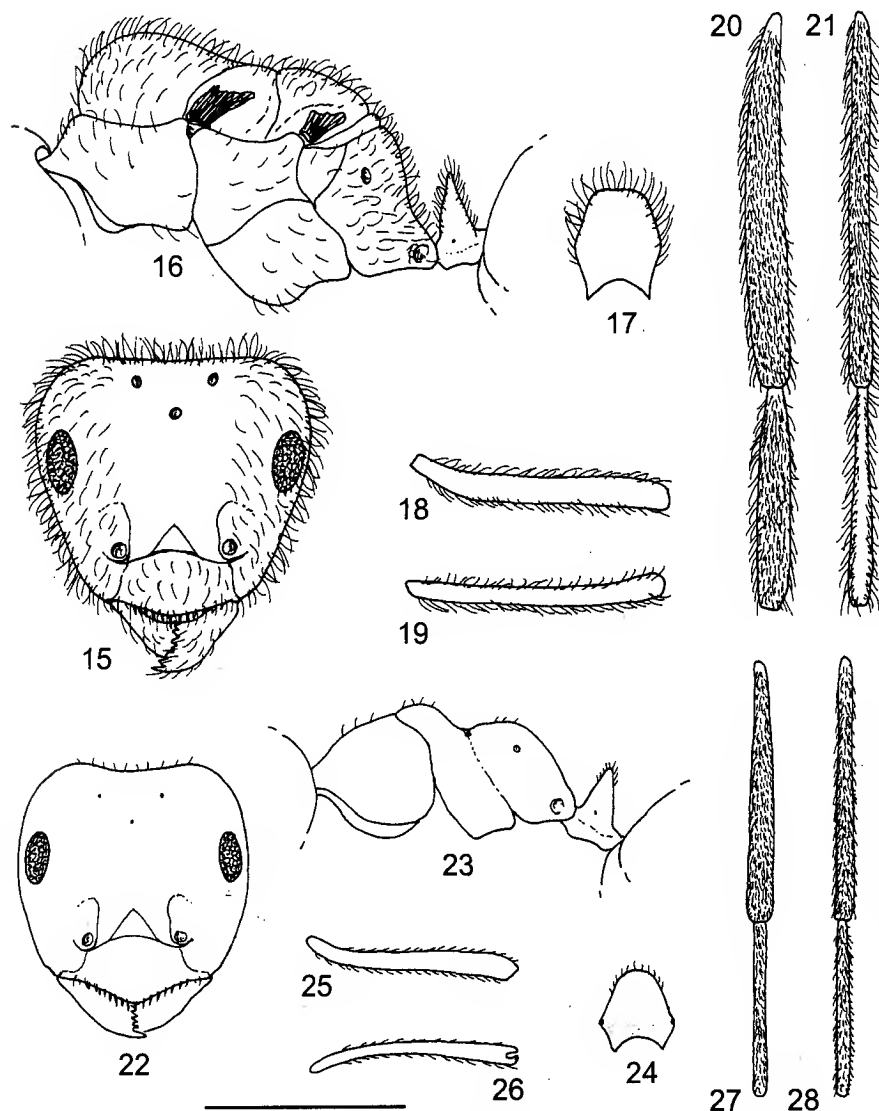
Notes. The type specimens of var. *capitatus* generally correspond to the original description, except that

their petiolar scale is somewhat thicker than in Fig. 4 of Kusnetsov-Ugamsky (1928).

In my opinion, for several reasons *L. capitatus* had the most ambiguous taxonomic position among all *Dendrolasius* species. First of all, even the usage of the name "*capitatus*" was misleading. It was introduced by Kusnetsov-Ugamsky (1927) as *nomen nudum*. He wrote "...Generally, this species [e. g. *L. fuliginosus*] is very stable on its characters; only the separate subspecies, recently described by me, *A. fuliginosus capitatus*, nov. (manuscript), lives in the Far East (South Ussuri Region)..." (loc. cit., p. 187). Later he has primarily used for this form the name "*Acanthomyops fuliginosus orientalis* Karawajew" and noted "...all specimens of *Acanth. (Dendrolasius) fuliginosus* Latr., collected by me in Ussuri Region [now - Primorsky Region of Russia], belong to the separate taxonomic unit, which Karawajew described as separate subspecies. Discriminating features of this subspecies are: maxillary palps rather long, 6-jointed, their third joint is the longest, each subsequent joint is shorter than the preceding one...Head without emargination on the occipital margin, or, at most, very shallowly emarginate... with broadly rounded occipital corners...Petiolar scale "flattly-rounded" [I do not understand properly what the author correctly meant even in Russian] ...The main features [e.g. separating this form from *L. fuliginosus*] are: lack of the emargination on the occipital margin of the head and a different structure of the maxillary palps..." (Kusnetsov-Ugamsky 1928, p. 17). Then, on p. 18 of that paper, the author unexpectedly used for this subspecies the name "*Ac. f. capitatus*"; he also used the same name (as "subsp. nov.") in the legend for Figs 1-4. In the following paper (Kusnetsov-Ugamsky, 1929) he used for the same Far Eastern form of *L. fuliginosus* the Karawajew's name "*orientalis*". Formally, the name "*capitatus*" could be considered as an unnecessarily proposed replacement name for var. *orientalis*, but in fact, *L. orientalis* is another species, that differs both from "*oriental fuliginosus*" and from *capitatus* (see below).

For many years the taxonomic status of the subspecies *capitatus* was enigmatic, until Wilson (1955) designated the lectotype of this form and considered it as a junior synonym of *L. fuliginosus* with such comments: "[the lectotype]...Possessing a shallow occipital emargination and short petiolar hairs, both of which characters seem to predominate in north-eastern Asia..." (loc. cit., p. 143).

On the contrary, Kupyanskaya (1989), according to Kusnetsov-Ugamsky's original description and drawings (see above) believed that the main diagnostic features of *L. capitatus* and *L. crispus* are actually the same. Hence, she revived the name *capitatus* from synonymy, raised it to species rank as senior synonym of *L. crispus* Wilson and provided some details characteristic of all of the three castes, although she considered the types of *L. capitatus* as probably lost. However, Kupyanskaya's



Figures 15–28. 15–21 *Lasius nipponensis* Forel, 1912 (queen) and 22–28 *L. capitatus* Kusnetzov-Ugamsky, 1928 (worker, lectotype). (15, 22) Head, frontal view; (16, 23) alitrunk and petiole, in profile; (17, 24) petiolar scale, frontal view; (18, 25) scape, dorsal view; (19, 26) same, lateral view; (20, 27) hind tibia and first tarsal joint, lateral view; (21, 28) same, dorsal view. Scale bar = 1 mm.

(1989, 1990) "*L. capitatus*" in fact refers to *L. nipponensis* (and its junior synonym *L. crispus*, see above) and does not match with the type specimens of *L. capitatus*.

L. capitatus seems the most similar to *L. morisitai* by the shape of the petiolar scale and by the short standing hairs on alitrunk and head, but workers of the latter species have a somewhat transversal head, which is wider than long ($CI \leq 1.00$ in type specimens of *L. capitatus* and ≥ 1.04 in *L. morisitai*); these species also differ by the presence of short but distinct subdecumbent hairs on the scape of *L. capitatus*, while scape of *L. morisitai* has dense decumbent pubescence only (compare Figs 25, 26 and 69, 70).

Distribution. Southern part of Russian Far East (Primorsky Region).

Lasius orientalis Karawajew, 1912,
stat. rev., stat. nov.
(Figs 29–37)

Lasius fuliginosus var. *orientalis* Karawajew, 1912: 586, w, Korea; Wheeler 1928: 123; as junior synonym of *L. fuliginosus* (Latreille): Wilson 1955: 138; Yamauchi 1978: 171; Kupyanskaya 1989: 783; 1990: 228; Bolton 1995: 225; as junior synonym of *L. nipponensis* Forel: Espadaler et al. 2001: 341; Imai et al. 2003: 60.

Lasius (*Chthonolasius*) *teranishii* Wheeler, 1928: 120, q, Japan, *nom. nov. pro Lasius umbratus*: Teranishi 1927: 92, *nec* Nylander 1846: 1048 *et auct.*; transferred to subgenus *Dendrolasius*: Wilson 1955: 146; Yamauchi and Hayashida 1968: 399, w, m; Yamauchi 1978: 174; Kupyanskaya 1989: 786; 1990: 230; Bolton 1995: 226; Imai et al. 2003: 59, *syn. nov.*

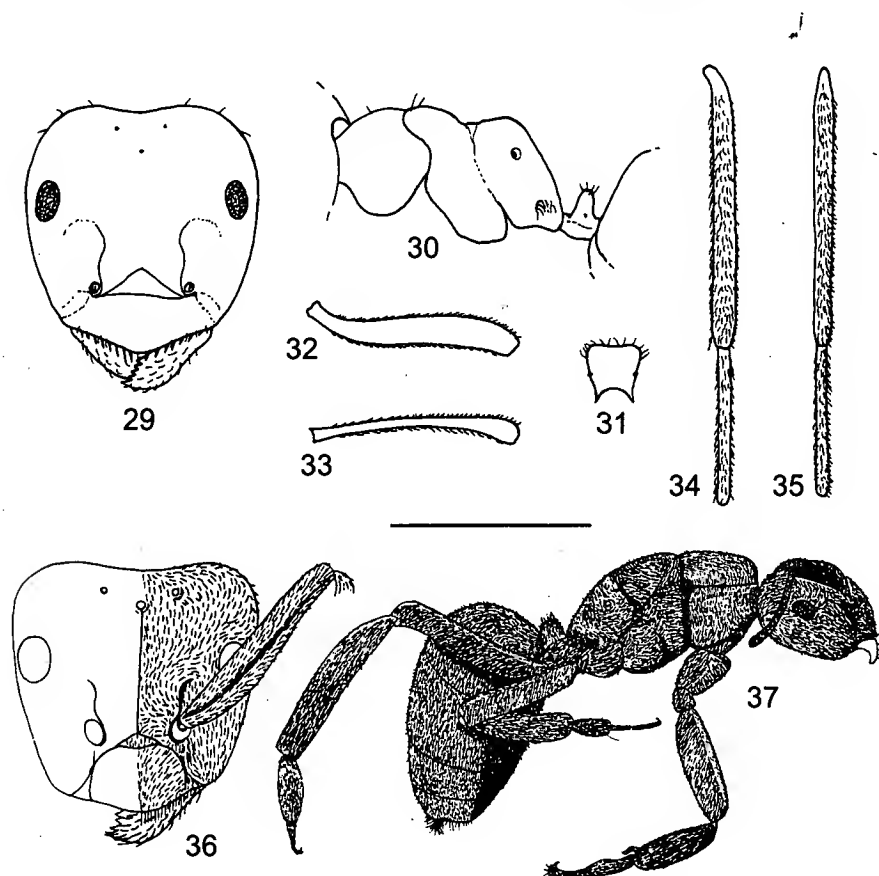
Lasius (*Chthonolasius*) *ouchii* Teranishi, 1940: 76, q, Japan; as junior synonym of *L. teranishii*: Wilson 1955: 146, *syn. nov.* (I have never seen any material referred to *L. ouchii* and this new synonymy is established following Wilson's, 1955 objective synonymy for *L. teranishii*).

Material examined. Neotype worker (designated here, see below), "Buhta Gaidamak, No. 3196, 21.V.1900, leg. P. Shmidt", "*Lasius fuliginosus* var. *orientalis* Karaw. Typus" (both labels hand written by Karawajew) (IZK). Non-type material: 16 workers from the nest of neotype; more than 20 workers from the Russian Far East, North Korea and Japan (IZK, MIZ, ZMMU, BPI).

Measurements and indices of the neotype of *L. orientalis* (data are in brackets) and of the workers

from the nest of the neotype specimen ($n = 16$) [mean data are in square brackets]: $HL_1 = 1.06\text{--}1.26$ (1.22) [1.17], $HL_2 = 1.12\text{--}1.33$ (1.32) [1.25], $HW_1 = 1.04\text{--}1.23$ (1.19) [1.15], $HW_2 = 0.70\text{--}0.80$ (0.77) [0.75], $SL = 1.01\text{--}1.12$ (1.09) [1.06], $OL = 0.18\text{--}0.27$ (0.25) [0.23], $AL = 1.18\text{--}1.44$ (1.34) [1.32]; $CI = 0.96\text{--}1.00$ (0.98) [0.98], $CLI = 1.05\text{--}1.09$ (1.08) [1.07], $CWI = 1.49\text{--}1.57$ (1.55) [1.54], $SI_1 = 0.88\text{--}0.95$ (0.90) [0.90], $SI_2 = 0.89\text{--}0.96$ (0.92) [0.92], $OI = 0.18\text{--}0.22$ (0.21) [0.20].

Diagnosis of workers and queens. Workers: petiolar scale (seen in profile) thick, low, not narrowing to the top; when seen in front or from behind, it gradually widens to the top; scape distinctly flattened, ratio of min/max diameters of the scape ≤ 0.5 ; head with convex sides, gradually and slightly narrowing anteriorly,



Figures 29–37. 29–35 *Lasius orientalis* Karawajew, 1912. (worker, neotype; 36, 37, queen [after Yamauchi and Hayashida 1968]); (29, 36) head, frontal view; (30) alitrunk and petiole, in profile; (31) petiolar scale, frontal view; (32) scape, dorsal view; (33) same, lateral view; (34) hind tibia and first tarsal joint, lateral view; (35) same, dorsal view; (37) body in profile. Scale bar = 1 mm.

with emarginate occipital margin; scape and legs with numerous short subdecumbent hairs; promesonotal dorsum and occipital margin with a few quite short standing hairs;

Queens: petiolar scale (seen in profile) thick, low, not narrowing to the top; when seen in front or from behind it gradually widens to the top; scape and legs, including the first tarsal joint, remarkably flattened, ratio of min/max diameters of scape and hind tibiae ≤ 0.4 ; head with emarginate occipital margin, but not cordiform and at most slightly wider than long; legs and scape with very dense decumbent pubescence; head, alitrunk and gaster with very dense decumbent pubescence; alitrunk dorsum with sparse, short erect hairs.

Notes. Karawajew's (1912) description of *L. fuliginosus* var. *orientalis* (workers) was very short and insufficient, and the most important diagnostic features of this form were not pointed at. The type localities of this species are "Koredschi und Dore, Halbinsel von Korea (19.VII.1900, P. Schmidt)" (Karawajew 1912, p. 582). In Karawajew's collection (IZK) I have found a couple of workers from Russian Far East and Korea, determined by Karawajew as *L. fuliginosus* var. *orientalis*. All of them undoubtedly belong to the same

species. Furthermore, 17 workers among this material, collected in Primorsky Region of Russia ("Buhta Gaidamak, No. 3196, 21.V.1900, leg. P. Schmidt"), bear also the additional Karawajew's label "*Lasius fuliginosus* var. *orientalis* Karaw. Typus". However, they cannot formally belong to the type series, because in the original description another type locality and date of collecting were given. I do not know why Karawajew did such a mistake, especially because he usually worked very accurately and left his own collection for the next generations of myrmecologists in perfect conditions. Though types of var. *orientalis* seem lost, I believe that specimens, collected about in the same region as the types, and originally determined by Karawajew as the species he described, really belong to var. *orientalis*. Hence, I designate as the neotype of *L. fuliginosus* var. *orientalis* Karawajew the worker from "Buhta Gaidamak, No. 3196, 21.V.1900, leg. P. Schmidt", labelled by Karawajew as "Typus".

Wilson (1955) synonymised var. *orientalis* with *L. fuliginosus* with such comments: "... Since the types are not available, synonymy in this case is tentative. The differences stated in the original description are of a trivial nature, and it would seem that if Karawajew had really had *spathepus* before him instead of *fuliginosus*, he would have noticed at least one of the several excellent characters which separate workers of these two species..." (loc. cit., p. 143), though he never saw the types of this form. Yamauchi (1978) and Kupyanskaya (1989, 1990) repeated this Wilson's synonymy, while Espadaler et al. (2001) considered var. *orientalis* as the junior synonym of *L. nipponensis* (see Notes to the latter species, above). The name "*orientalis*" was also used by Kusnetzov-Ugamsky (1928, 1929); however, the specimens from Russian Far East, collected and investigated by him, belong to another species (see Notes to *L. capitatus*, above).

The most astonishing fact is that var. *orientalis* is neither *L. capitatus*, nor "*oriental fuliginosus*", nor *L. nipponensis*. All specimens from Karawajew's collection mentioned above, including the neotype, have the distinctly flattened antennal scape and the very thick, low petiolar scale (seen in profile), which is gradually widened to the apex when seen in front or from behind (see Figs 29–35). These diagnostic features completely match

those of *L. teranishii* Wheeler (see Yamauchi and Hayashida 1968; Yamauchi 1978; Kupyanskaya 1989, 1990), what let me consider *L. orientalis* Karawajew, 1912 as the senior synonym of *L. teranishii* Wheeler, 1928.

Distribution. Southern part of Russian Far East (Amursky and Primorsky Regions, Islands Shikotan and Kunashir), Korean Peninsula, Japan (Hokkaido, northern and central Honshu).

Lasius spathepus Wheeler, 1910 (Figs 38–51)

Lasius spathepus Wheeler 1910: 130, q, Japan; 1928: 121, w, m; Wilson 1955: 147; Yamauchi and Hayashida 1968: 401; Yamauchi 1978: 172; Kupyanskaya 1989: 787; 1990: 231; Bolton 1995: 225; Imai et al. 2003: 59.

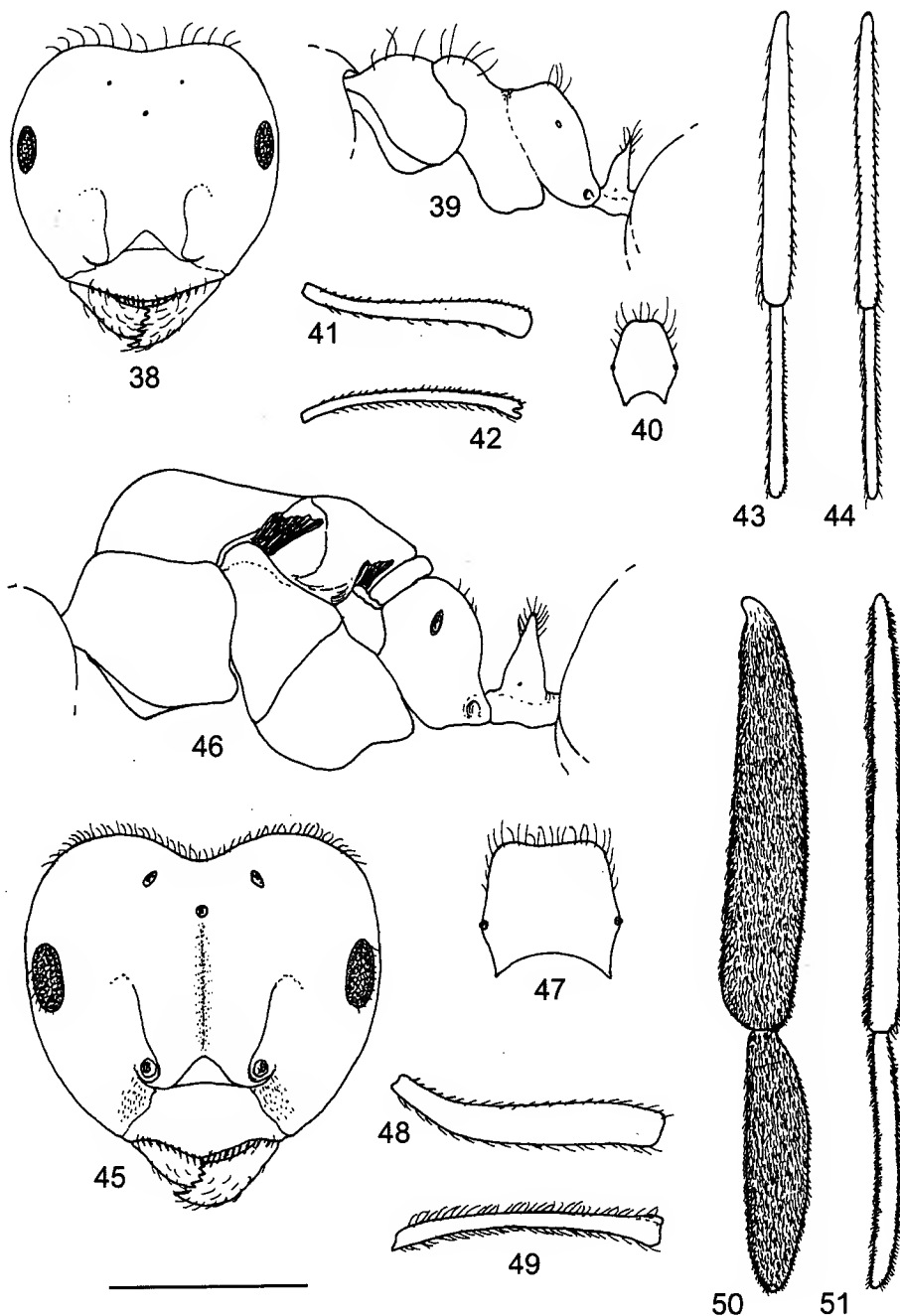
Material examined. Holotype queen: "Japan, Kuwana coll., 1910", "Type", "Holotype *Lasius spathepus* Wheeler", "M.C.Z. type 71691" (MCZ). Non-type material: about 30 workers, 1 queen from the Russian Far East, North Korea and Japan (MCZ, IZK, MIZ, ZMMU, BPI, JUK).

Measurements and indices of the holotype queen: $HL_1 = 1.66$, $HL_2 = 1.85$, $HW_1 = 2.03$, $HW_2 = 1.28$, $SL = 1.55$, $OL = 0.43$, $AL = 2.53$ mm;

$CI = 1.22$, $CLI = 1.11$, $CWI = 1.59$, $SI_1 = 0.93$, $SI_2 = 0.76$, $OI = 0.21$.

Diagnosis of workers and queens. Workers: petiolar scale (seen in profile) thin, distinctly narrowing to the top, asymmetrical; when seen in front or from behind it gradually narrowing to the top, with straight or slightly notched dorsal crest; scape distinctly flattened, ratio of min/max diameters of the scape ≤ 0.5 ; head with convex sides, gradually and slightly narrowing anteriorly, with emarginate occipital margin; scape and legs with numerous short subdecumbent hairs; promesonotal dorsum and occipital margin of the head with relatively sparse and long standing hairs;

Queens: petiolar scale (seen in profile) thin, distinctly narrowing to the top, asymmetrical; head with deeply emarginate occipital margin, cordiform, distinctly wider



Figures 38–51. *Lasius spathepus* Wheeler, 1910 (38–44, worker; 45–51, queen, holotype); (38, 45) head, frontal view; (39, 46) alitrunk and petiole, in profile; (40, 47) petiolar scale, frontal view; (41, 48) scape, dorsal view; (42, 49) same, lateral view; (43, 50) hind tibia and first tarsal joint, lateral view; (44, 51) same, dorsal view. Scale bar = 1 mm.

than long; scape and legs, including the first tarsal joint, remarkably flattened, ratio of min/max diameters of scape and hind tibiae ≤ 0.4 ; legs with dense decumbent to subdecumbent pubescence; antennal scape with abundant subdecumbent to suberect hairs; head, alitrunk and gaster with very short and sparse decumbent pubescence, alitrunk dorsum without standing hairs.

Notes. *Lasius spathepus* is the most peculiar species of the genus, especially for the characters of its queens (see above and Figs 45–51). Workers are similar to those of *L. orientalis* by their distinctly flattened scape, but well differ from the latter by the much thinner, narrowing at the top petiolar scale (seen in profile, compare Figs 39, 40 and 30, 31). On the other hand, the shape of petiolar scale recalls *L. nipponensis*, but in the latter the scale is not flattened.

Wheeler (1910) described *L. spathepus* from the single queen from Japan (he described workers and males in 1928). This queen has a so peculiar shape of legs and head that Wheeler discussed the possibility of the existence of two different morphs of queens in that *Lasius* species. Further investigations showed that *L. spathepus* has unusual queens only, rather than normal ones (Wilson 1955; Yamauchi 1978; Kupyanskaya 1989, 1990; Imai et al. 2003).

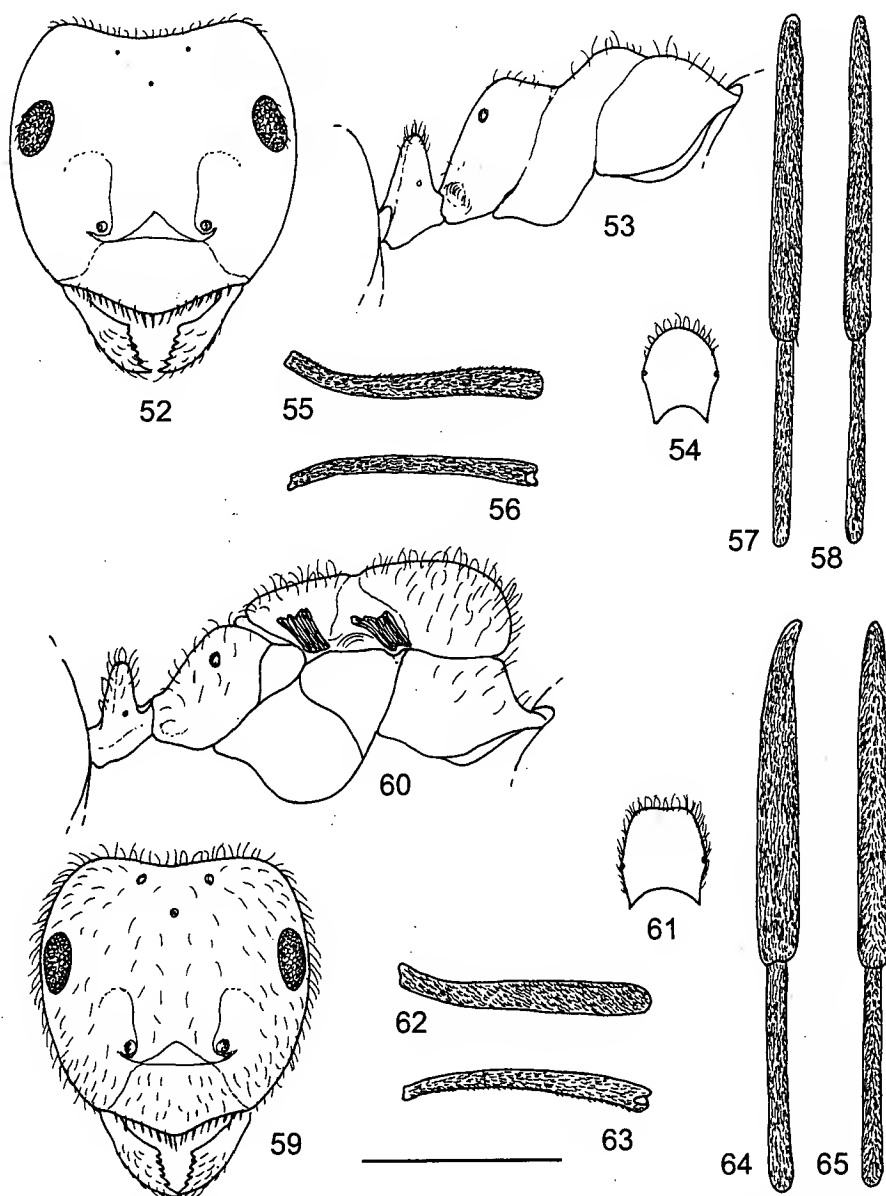
Distribution. Southern part of Russian Far East (known only from one locality: Primorsky Region, Anisimovka), Korean Peninsula, Japan (all four main Islands).

***Lasius morisitai* Yamauchi, 1978**
(Figs 66–79)

Lasius morisitai Yamauchi 1978: 176, w, q, m, Japan; Kupyanskaya 1989: 787; 1990: 232; Bolton 1995: 224; Imai et al. 2003: 60.

Material examined. About 20 workers, 2 queens from the Russian Far East, North Korea and Japan (IZK, MIZ, ZMMU, BPI, JUK).

Diagnosis of workers and queens. Workers: petiolar scale (seen in profile) relatively thin, though not flattened at the top, approximately inversely V-shaped; when seen in front or from behind, it is only slightly narrowing to the dorsal crest; head shorter than broad ($CI \geq 1.04$), with convex sides, gradually and slightly narrowing anteriorly, and with distinctly emarginate occipital margin; scape, mid and hind tibiae not flattened, elliptical in cross-section; ratio of min/max diameters of the scape > 0.7 ; scape and legs with decumbent



Figures 52–65. *Lasius fuji* sp. nov. (52–58, worker, holotype; 59–65, queen, paratype); (52, 59) head, frontal view; (53, 60) alitrunk and petiole, in profile; (54, 61) petiolar scale, frontal view; (55, 62) scape, dorsal view; (56, 63) same, lateral view; (57, 64) hind tibia and first tarsal joint, lateral view; (58, 65) same, dorsal view. Scale bar = 1 mm.

pilosity only, without standing hairs; promesonotal dorsum and occipital margin with abundant, quite short standing hairs;

Queens: petiolar scale (seen in profile) is relatively thin, though not flattens at the top; head with convex sides, gradually and slightly narrowing anteriorly, and with shallowly emarginate occipital margin; scape, mid and hind tibiae not flattened, elliptical in cross-section; ratio of min/max diameters of the scape > 0.7 ; legs and scape with dense decumbent pubescence only; head, alitrunk and gaster with very sparse short standing hairs, and with extremely short and sparse decumbent pubescence, appears shiny.

Notes. *Lasius morisitai* was the last species, described in the subgenus *Dendrolasius* (Yamauchi 1978). Its workers most resemble *L. capitatus*, differing from them mainly by the wider, transverse head and by the absence of subdecumbent hairs on the antennal scape; they are also similar to *L. fuji* and differ from the latter by the wider head, shorter standing hairs on the alitrunk dorsum and somewhat thinner petiolar scale (compare Figs 52–58 and 22–28, 66–72). However, queens of *L. morisitai* well differ from those of *L. fuji* by the very sparse decumbent pubescence of the body and much shorter and less abundant standing hairs on the alitrunk dorsum (compare Figs 59–65 and 73–79).

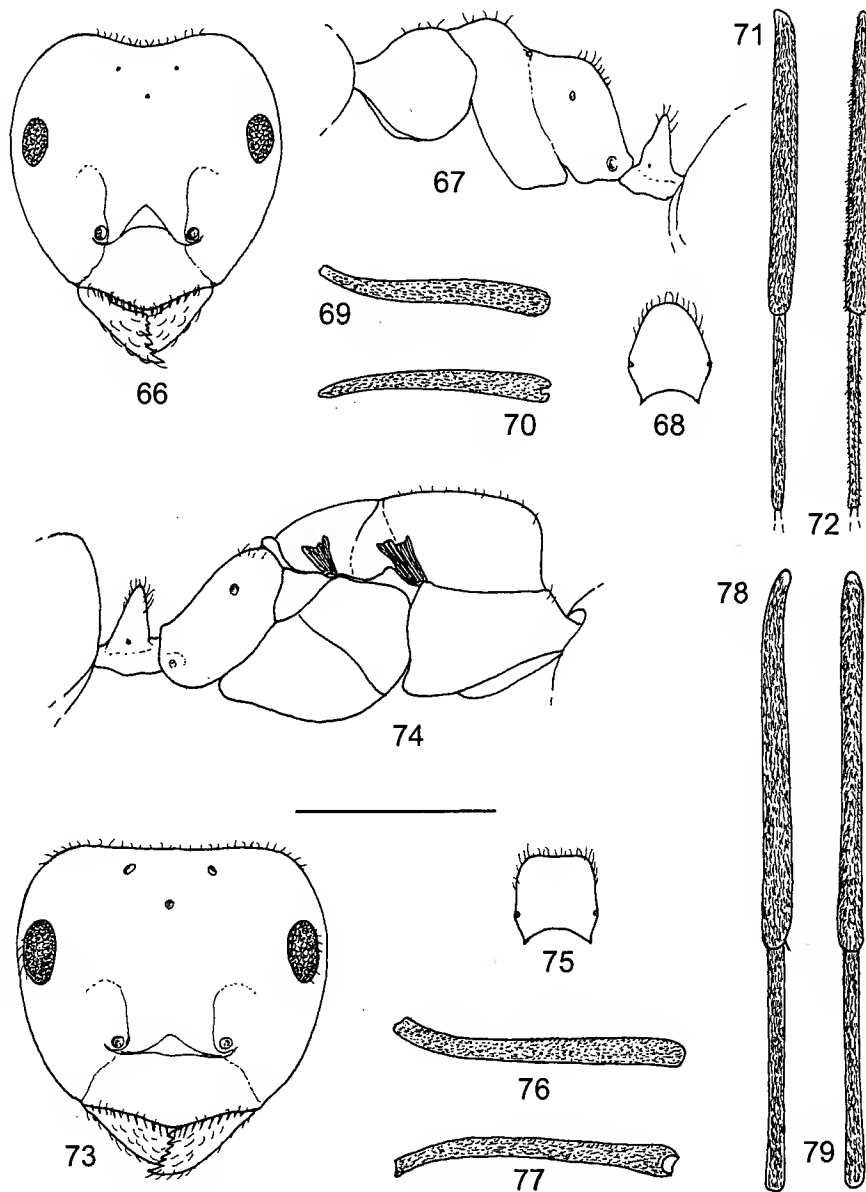
Distribution. Southern part of Russian Far East (Primorsky Region, Ussuriysky Natural Reserve), Korean Peninsula, Japan (central Honshu).

As mentioned above, Espadaler et al. (2001) provided both morphological and molecular evidence that the "oriental *fuliginosus*" is a distinct species, differs from the "typical" *L. fuliginosus* (Latreille) distributed in the western part of the Palaearctic Region (e. g. as far east as the Altai Mts.), and have proposed for it the replacement name *L. nipponensis* Forel (as the oldest name referred to this species). Nevertheless, neither *L. nipponensis*, nor any other name referable to *Dendrolasius*, can not be used instead of "oriental *fuliginosus*", since all of them are assigned to other species. In such a situation I have to described as new the following species.

Lasius fuji sp. nov.
(Figs 52–65)

Lasius fuliginosus: eastern populations only, distributed from Amursky Region of Russia to Japan; revisions and reviews: Wilson 1955: 138; Yamauchi and Hayashida 1968: 398; Yamauchi 1978: 171; Kupyanskaya 1989: 783; 1990: 227; Wu and Wang 1995: 156; Bolton 1995: 223, *nec* Latreille 1798: 36.

Lasius nipponensis: as junior synonym of *L. fuliginosus*: Wilson 1955: 138; Yamauchi 1978: 171; Kupyanskaya 1989: 783; 1990: 227; Wu et Wang 1995: 156; Bolton 1995: 224; revived from synonymy and raised to species as the first available name for "oriental *fuliginosus*": Espadaler et al. 2001: 340; Imai et al. 2003: 60, *nec* Forel 1912: 339.



Figures 66–79. *Lasius morisitai* Yamauchi, 1978 (66–72, worker; 73–79, queen); (66, 73) head, frontal view; (67, 74) alitrunk and petiole, in profile; (68, 75) petiolar scale, frontal view; (69, 76) scape, dorsal view; (70, 77) same, lateral view; (71, 78) hind tibia and first tarsal joint, lateral view; (72, 79) same, dorsal view. Scale bar = 1 mm.

Material examined. Holotype, worker, North Korea, Prov. Chagang, Myohyang-san Mts., way to Pirobong, No. 275–85, 25.VI.1985, leg. M. Woyciechowski (IZK); paratypes: 15 workers, 6 queens from the same nest as the holotype; more than 50 workers: North Korea, Prov. Hwanghae-pukto, 8 km W Haeju, Sujang-san Mts, 55 m a.s.l., *Pinus-Quercus* forest, No. 44–85, 15.VI.1985; *ibid.*, 600 m a.s.l., young *Quercus* forest, No. 81–85, 17.VI.1985; Prov. Chagang, Myohyang-san Mts, below Chonju Rock, No. 169–85, 22.VI.1985, 230 m a.s.l., deciduous forest; Prov. Chagang, Myohyang-san Mts, near monastery Pliodae, No. 217–85, 24.VI.1985, 540 m, a.s.l, pine-

chestnut forest; Prov. Samjion, shore of Lake Samjion, No. 596–85, 10.VII.1985, 1360m, *Larix* forest; Prov. Kangwon, Kumgang-san Mts, above Kurjong waterfall, No. 708–85, 18.VII.1985, 710 m, deciduous forest (all leg. M. Woyciechowski); 27 workers, North Korea, Onpho near Chogjin, No. 2355, 12.VIII.1959, leg. B. Pisarski and J. Prószyński; 5 workers, Prov. Hamgyong-pukto, distr. Orang, Changyon Lake, 17.VI.1990, leg. R. Pisarska; 5 workers, Russia, vicinity of Vladivostok, 5.V.1989, *Quercus* forest, leg. A. Radchenko; *ibid.*, 2 workers, 1 queen, 1 male, 2.VI.1983, leg. A. Kupyanskaya; 4 workers, Russia, Isl. Sakhalin, Chehova Mt., val. of the riv. Bureya, 29.VII.1986, leg. M. Nesterov; 4 workers, Russia, Primorky Region, Ussuriysky Natural Reserve, 10.VIII.1986, leg. A. Kotenko; 3 workers, Japan, Pref. Kanagawa, Doryosan, 10.VII.1982, leg. M. Kubota; 5 workers, "Japonia, Sauter" (IZK, MIZ, JUK, BPI).

Since all three castes of "*oriental fuliginosus*" were described and characterised comprehensively several times by different authors (Wilson 1955; Yamauchi 1978; Kupyanskaya 1989, 1990; Espadaler et al. 2001; Imai et al. 2003), I do not provide formal description, just give the diagnosis of workers and queens, and the drawings and measurements of type specimens. The main differential features of it and *L. fuliginosus* are given in Table 1. The differences between *L. fuji* and other East-Asian *Dendrolasius* species are given in the Key.

Measurements and indices of type specimens (the data of holotype are in brackets), [mean data are in square brackets] workers: $HL_1 = 1.19\text{--}1.43$ (1.41) [1.33]; $HL_2 = 1.29\text{--}1.51$ (1.51) [1.42], $HW_1 = 1.18\text{--}1.43$ (1.43) [1.32], $HW_2 = 0.71\text{--}0.95$ (0.92) [0.82], $SL = 1.08\text{--}1.27$ (1.27) [1.19], $OL = 0.24\text{--}0.28$ (0.28) [0.26], $AL = 1.50\text{--}1.68$ (1.68) [1.57] mm; $CI = 0.95\text{--}1.01$ (1.01) [0.99], $CLI = 1.06\text{--}1.10$ (1.07) [1.07], $CWI = 1.53\text{--}1.57$ (1.55) [1.60], $SI_1 = 0.86\text{--}0.92$ (0.90) [0.89], $SI_2 = 0.88\text{--}0.93$ (0.89) [0.90], $OI = 0.18\text{--}0.21$ (0.20) [0.19]; queens: $HL_1 = 1.36\text{--}1.40$ [1.38]; $HL_2 = 1.44\text{--}1.50$ [1.47], $HW_1 = 1.40\text{--}1.46$ [1.42], $HW_2 = 0.83\text{--}0.87$ [0.84], $SL = 1.26\text{--}1.27$ [1.265], $OL = 0.34\text{--}0.36$ [0.345], $AL = 1.90\text{--}2.04$ [1.97] mm; $CI = 1.03\text{--}1.04$ [1.033], $CLI = 1.06\text{--}1.07$ [1.066], $CWI =$

$1.68\text{--}1.70$ [1.69], $SI_1 = 0.91\text{--}0.93$ [0.92], $SI_2 = 0.88\text{--}0.90$ [0.89], $OI = 0.24\text{--}0.25$ [0.243].

Diagnosis of workers and queens. Workers: petiolar scale (seen in profile) relatively thick, not flattened at the top, approximately inversely U-shaped; when seen in front or from behind, it is only slightly narrowing to the dorsal crest; head with convex sides, gradually and slightly narrowing anteriorly, and with distinctly emarginate occipital margin; scape, mid and hind tibiae not flattened, elliptical in cross-section; ratio of min/max diameters of the scape > 0.7 ; scape and legs with decumbent pilosity only; promesonotal dorsum and occipital margin with relatively short and abundant standing hairs.

Queens: petiolar scale (seen in profile) relatively thick, not flattened at the top, approximately inversely U-shaped; head with convex sides, gradually and slightly narrowing anteriorly, and with distinctly emarginate occipital margin; scape, mid and hind tibiae not flattened, elliptical in cross-section; ratio of min/max diameters of the scape > 0.7 ; legs and scape with dense decumbent pubescence only; head, alitrunk and gaster with abundant, but not very long standing hairs, and with well-developed decumbent pubescence.

Distribution. Russian Far East (Amursky, Khabarovsk and Primorsky Regions, Isl. Sakhalin, Southern Kurily Islands), north-eastern China, Korean Peninsula, Japan (all four main Islands); it is the most common *Dendrolasius* species in this area.

Etymology. The species is named after Fuji-san Mt., one of the greatest symbols of Japan.

Key to *Lasius* (*Dendrolasius*) species of the East Palaearctic

Though there are several recent versions of the Keys to the identification of East Palaearctic *Dendrolasius* species (Yamauchi and Hayashida 1968; Yamauchi 1978; Kupyanskaya 1989, 1990; Imai et al. 2003), I proposed somewhat modified version of the Key, including one species more.

<i>L. fuji</i> sp. nov.	<i>L. fuliginosus</i> (Latreille)
workers	workers
– head usually somewhat longer than wide ($CI\ 0.95\text{--}1.01$);	– head length equal to or less than its width ($CI\ 1.00\text{--}1.03$);
– scape relatively longer ($SI_2\ 0.88\text{--}0.95$);	– scape relatively shorter ($SI_2\ 0.82\text{--}0.89$);
– standing hairs on the upper margin of petiolar scale longer, the longest hairs distinctly longer than the half of the maximum diameter of the scape;	– standing hairs on the upper margin of petiolar scale shorter, the longest hairs shorter than the half of the maximum diameter of the scape;
– decumbent pubescence on the anterior (vertical) surface of first gastral tergite relatively dense, distance between hairs distinctly shorter than the hairs length;	– decumbent pubescence on the anterior (vertical) surface of first gastral tergite relatively sparse, distance between hairs not shorter (usually longer) than the hairs length;
queens	queens
– eyes with somewhat longer hairs, length of the longest ones ≥ 0.040 mm	– eyes with somewhat shorter hairs, length of the longest ones ≤ 0.035 mm

Table 1. The main differential features of *L. fuji* and *L. fuliginosus*.

Workers

1. Scape strongly dorso-ventrally flattened, ratio of its min/max diameters ≤ 0.5 (Figs 32, 33, 41, 42) 2
- Scape not dorso-ventrally flattened, elliptical in cross-section, ratio of its min/max diameters > 0.7 (Figs 4, 5, 25, 26, 55, 56, 69, 70) 3
- 2(1). Petiolar scale (seen in profile) thick, low, not narrowing to the top, with widely rounded dorsal crest, symmetrical; seen in front or from behind, it is the widest at the dorsal crest (Figs 30, 31) ...
..... *L. (D.) orientalis* Karawajew
- Petiolar scale (seen in profile) thin, quite high, asymmetrical, narrowing to the top, with flattened dorsal crest; seen in front or from behind, it is the widest at the level of spiracles, then gradually narrowing to the dorsal crest (Figs 39, 40)
..... *L. (D.) spathopus* Wheeler
- 3(1). Petiolar scale, seen in front or from behind, distinctly tapering to the top, with very narrowly rounded dorsal crest; seen in profile, it is thin, with flattened dorsal crest (Figs 2, 3). Occipital margin shallowly emarginate (Fig. 1)
..... *L. (D.) nipponensis* Forel
- Petiolar scale, seen in front or from behind, only slightly narrowing to the top, with widely rounded, straight or slightly emarginate dorsal crest; seen in profile, it is relatively thick, its dorsal crest never flattened (Figs 23, 24, 53, 54, 67, 68). Occipital margin of different shape (Figs 22, 52, 66) 4
- 4(3). Petiolar scale (seen in profile) thicker, very slightly narrowing to the top, approximately inversely U-shaped (Fig. 53). Occipital margin distinctly emarginated (Fig. 52) *L. (D.) fuji* sp. nov.
- Petiolar scale (seen in profile) somewhat thinner, distinctly narrowing to the top, approximately inversely V-shaped (Figs 23, 67). Occipital margin of different shape (Figs 22, 66) 5
- 5(4). Scape with short, but distinct subdecumbent hairs (Figs 25, 26). Occipital margin shallowly emarginate (Fig. 22). Head somewhat longer than broad, at most as long as wide ($CI \leq 1.00$)
..... *L. (D.) capitatus* Kusnetzov-Ugamsky
- Scape with dense decumbent pubescence only (Figs 69, 70). Occipital margin distinctly emarginate (Fig. 66). Head somewhat wider than long ($CI \geq 1.04$) *L. (D.) morisitai* Yamauchi
- 0.6, same of hind tibia > 0.7 (Figs 11–14, 62–65, 76–79) 3
- 2(1). Body and appendages with very dense decumbent pubescence, alitrunk dorsum with relatively sparse, short standing hairs; petiolar scale (seen in profile) low, thick, not narrowing to the top, with widely rounded dorsum (Fig. 37). Head with emarginate occipital margin, but not cordiform and at most slightly wider than its length (Fig. 36)
..... *L. (D.) orientalis* Karawajew
- Body (except the appendages) with very short and sparse decumbent pubescence, alitrunk dorsum without standing hairs; petiolar scale (seen in profile) quite high, narrowing to the top, with a very thin dorsal crest (Fig. 46). Head with strongly emarginate occipital margin, cordiform, distinctly wider than long (Fig. 45) *L. (D.) spathopus* Wheeler
- 3(1). Body appears shiny, with very sparse short standing hairs, and with extremely short and sparse decumbent pubescence (Fig. 74)
..... *L. (D.) morisitai* Yamauchi
- Body appears dull, with numerous, long standing hairs; decumbent pubescence abundant or sparse (Figs 16, 60) 4
- 4(3). Head in full face view distinctly narrowing anteriorly, its lateral margins in front of the eyes almost straight; occipital margin very shallowly concave or almost straight; head outline with very abundant, long, often curved, protruding standing hairs (Fig. 15). Petiolar scale (seen in profile) thin, distinctly narrowing to the top, with a somewhat flattened dorsal crest (Fig. 16). Hind tibiae and scape with dense decumbent pubescence and numerous subdecumbent hairs (Figs 18–21)
..... *L. (D.) nipponensis* Forel
- Head in full-face view weakly narrowed anteriorly, with regularly convex sides; occipital margin distinctly emarginate; head outline with less abundant, relatively short, straight standing hairs (Fig. 59). Petiolar scale (seen in profile) thick, at most slightly narrowing to the top, with a rounded dorsal crest (Fig. 60). Hind tibiae and scape with dense decumbent pubescence only (Figs 62–65)
..... *L. (D.) fuji* sp. nov.

Queens (queens of *L. capitatus* are unknown)

1. Scape and legs, including the first tarsal joint, remarkably flattened, ratio of min/max diameters of scape and hind tibiae ≤ 0.4 (Figs 36, 37, 48–51) 2
- Scape and legs not flattened, elliptical in cross-section, ratio of min/max diameters of scape $>$

Stärcke (1942) described *L. buccatus* from Bosnia, based on the queens and male. I have never seen neither the type specimens of this species, nor any other materials referred to it, and have not definitive opinion on the taxonomic status of this form. However, Wilson (1955) supposed *L. buccatus* to be a good species on the basis of several somewhat unusual characters of the queens, especially for their head narrower than the alitrunk. If Stärcke's description and drawings were correct, this feature would be unique for *Dendrolasius* species. This question may be clarified after obtaining the type specimens and additional material from the type locality or any adjacent regions.

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